

PATENT SPECIFICATION

719,269

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COMPLETE SPECIFICATION.

Improvements relating to the Manufacture of Electric Discharge Lamps.

We, THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, a British Company having its registered office at Crown House, Aldwych, London, W.C.2, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in the manufacture of electric discharge lamps containing an alkali metal which vapourises during the operation of the lamp.

Alkali metal vapour, and particularly sodium vapour, readily attacks glasses normally used for the envelopes of electric discharge lamps. It has, therefore, generally been the practice to make the envelope of a sodium vapour lamp (sodium being the most usual alkali metal to employ for such lamps) of a glass of the soda-lime-silicate type, which does not resist attack by alkali metal vapour but which otherwise possesses qualities rendering it suitable as an envelope material, and to provide the interior of the envelope with a coating of a glass of the borate type which resists attack by the alkali metal and its vapour. Such lamps are found to acquire a characteristic yellow stained appearance during life.

In the Specification of our prior Patent No. 675,594 is described a glass of the borophosphate type capable of resisting attack by alkali metal vapour and otherwise suitable for application as a protective layer to glasses of the borosilicate type. As a result of the lower coefficient of expansion of borosilicate glasses, greater freedom from cracking in production is achieved when a borosilicate glass is used instead of a glass of the soda-lime-silicate type for the envelope of the lamp; it thus becomes possible to use a borosilicate glass coated with a borophosphate

glass for the lamp envelope with a resulting improvement in production.

It has been found that borophosphate glasses suffer from a surface condition (which may arise from atmospheric gases and vapours, during manufacture of the glass part, during any standard period before lamp manufacture, and during any glass shaping operations connected with the lamp manufacture) which prevents an entirely satisfactory sodium vapour lamp being constructed with the borophosphate glass in contact with sodium vapour.

The object of this invention is to provide a surface treatment for a borophosphate glass so that alkali metal vapour lamps may be made having better lumen maintenance than was practicable with untreated borophosphate glass.

According to the invention glass envelope parts for electric discharge lamps of the alkali metal vapour type and consisting wholly or in part of a borophosphate glass are treated, prior to their being brought into contact with the alkali metal vapour, to remove surface contamination by subjecting them to hot water at a temperature of about 70° C for a period of up to 15 minutes, followed by washing with cold distilled water, and finally drying in warm air at a temperature of about 30° C.

A simple and preferred method of treatment consists of immersing the shaped glass envelope at the latest possible stage in lamp manufacture in the hot water at a temperature of about 70° C for a period of from 2 to 15 minutes, immediately transferring the shaped glass envelope to a cold distilled water bath, allowing to drain and drying in warm air at a temperature of approximately 30° C. It is preferred to use for the hot water bath, distilled water which has been slightly acidified with nitric acid; say 0.2% of nitric acid.

[Price 2s. 8d.]

This treatment is effective in the removal not only of surface contamination but also of any materials on or in the surface of the borophosphate glass which are easily dissociated by the sodium vapour during operation of the lamp.

Where it is the inside only of the glass part, e.g., the envelope, that requires treatment the process may be carried out by passing the hot and cold water through the envelope without immersing in a bath.

Materials found to have a deleterious effect on luminous efficiency during the life of sodium lamps which are removed by this treatment are ampounds, e.g., sulphate and silicate, of magnesium and iron.

A batch of 140 watt lamps treated in the preferred manner were found to give luminous efficiencies of 74 lumens per watt initial and 71.5 lumens per watt at 4,000 hours life. An equivalent batch untreated gave efficiencies of 74 lumens per watt initial and 57 lumens per watt at 3,000 hours.

The treated lamps are cleaner in appearance during life than the untreated; furthermore, by using borophosphate glass in contact with the sodium vapour and treating it by the process of the invention, the characteristic yellow stained appearance of sodium vapour lamps is avoided.

What we claim is:—

1. In the manufacture of envelopes for

electric discharge lamps of the kind in which the discharge takes place in a vapour of an alkali metal, the glass envelope parts being protected against attack by the alkali metal vapour by constructing them wholly or in part of a glass of a borophosphate type, the treatment of the glass envelope parts prior to their being brought into contact with the alkali metal vapour consisting in subjecting the parts to hot water at a temperature of about 70° C for a period of up to 15 minutes, followed by washing with cold distilled water, and finally drying in warm air at a temperature of about 30° C.

2. The treatment of glass envelope parts for electric discharge lamps according to claim 1, wherein the shaped glass envelopes are subjected to immersion in the hot and cold water followed by drying at the latest possible stage in the manufacture of the envelope of the lamp.

3. In the process of treating glass envelope parts for electric discharge lamps of the alkali metal vapour type as claimed in claim 1 or 2, the use of hot distilled water which has been acidified, preferably with nitric acid, for the hot-washing step.

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PROVISIONAL SPECIFICATION.

Improvements relating to the Manufacture of Electric Discharge Lamps.

We, THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, a British Company having its registered office at Crown House, Aldwych, London, W.C.2, do hereby declare this invention to be described in the following statement:—

This invention relates to improvements in the manufacture of electric discharge lamps containing an alkali metal which vapourises during the operation of the lamp.

Alkali metal vapour, and particularly sodium vapour, readily attacks glasses normally used for the envelopes of electric discharge lamps. It has, therefore, generally been the practice to make the envelope of a sodium vapour lamp (sodium being the most usual alkali metal to employ for such lamps) of a glass of the soda-lime-silicate type, which does not resist attack by alkali metal vapour but which otherwise possesses qualities rendering it suitable as an envelope material, and to provide the interior of the envelope with a coating of a glass of the borate type which resists attack by the alkali metal and its vapour.

In the Specification accompanying Patent Application No. 28962/49 is described a

glass of the borophosphate type capable of resisting attack by alkali metal vapour and otherwise suitable for application as a protective layer to glasses of the borosilicate type. As a result of the lower coefficient of expansion of borophosphate glasses of this character, greater freedom from cracking in production is achieved.

It has been found that most glasses "weather", i.e., suffer surface contamination from atmospheric gases and vapours, during manufacture of the glass part, during any standing period before lamp manufacture and during any glass shaping operations connected with the lamp manufacture.

The object of this invention is to provide a surface treatment for a borophosphate glass so that alkali metal vapour lamps may be made having better lumen maintenance than was practicable with untreated borophosphate glass or borate glass.

According to the invention glass parts for electric discharge lamps of the alkali metal vapour type and consisting wholly or in part of a borophosphate glass are treated to remove surface contamination by subjecting them to hot water at a temperature of about

- 70° C for a period of up to 15 minutes, followed by washing with cold distilled water, and finally drying in warm air at a temperature of about 30° C.
- 5 A simple and preferred method of treatment consists of immersing the shaped glass envelope at the latest possible stage in lamp manufacture in the hot water for a period of from 2 to 15 minutes, immediately transferring the shaped glass envelope to a cold distilled water bath, allowing to drain and drying in warm air at a temperature of approximately 30° C.
- 10 This treatment is effective in the removal not only of surface contamination but also of any materials on or in the surface of the borophosphate glass which are easily dissociated by the sodium vapour during operation of the lamp.
- 15 Where it is the inside only of the glass part, e.g., the envelope, that requires treatment the process may be carried out by passing the hot and cold water through the envelope without immersing in a bath.
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- Materials found to have a deleterious effect on luminous efficiency during the life of sodium lamps which are removed by this treatment are salts, e.g., sulphate and silicate, of magnesium and iron.
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- A batch of 140 watt lamps treated in the preferred manner were found to give luminous efficiencies of 74 lumens per watt initial and 71.5 lumens per watt at 4,000 hours life. An equivalent batch untreated gave efficiencies of 74 lumens per watt initial and 57 lumens per watt at 3,000 hours.
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- The treated lamps are cleaner in appearance during life than the untreated, and the treatment has eliminated the characteristic yellow stained appearance of lamps made with either borophosphate or borate glasses untreated by the process of the invention.
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